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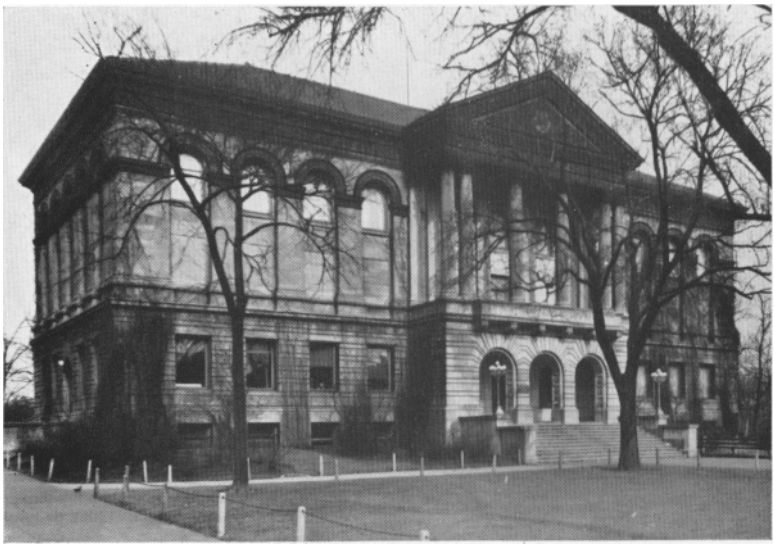

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THE TIMBER RATTLESNAKE

I only know thee humble bold,
Haughty, with miseries untold,
And the old curse that left thee cold,
And drove thee ever to the sun
On blistering rocks . . . Thou whose fame
Searchest the grass with tongue of flame,
Making all creatures seem thy game,
When the whole woods before thee run,
Asked but—when all is said and done—
To lie untrodden, in the sun.

BRETE HARTE

Poisonous Snakes of Illinois

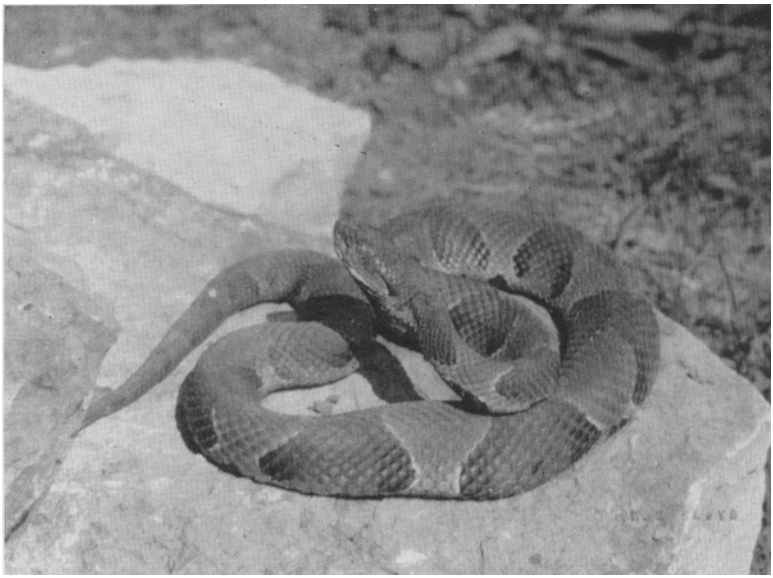
WALTER L. NECKER

SNAKES, in particular the poisonous species, are always an interesting topic for visitors at the museum, and especially so since recent publicity about rattlesnake dens near Chicago. This article aims to answer some of the more frequent questions and elucidate the more interesting facts concerning poisonous snakes and their poisons. Ostensibly, it is an account of the four Illinois species (which are also the only species for all the northeastern states), an exhibit of which has recently been opened in the Academy. The general discussion appended is enlarged to take in all types of poisonous snakes, and endeavors to give a general view of the group.

The huge mass of popular misconceptions about snakes is difficult to combat—it is too deeply rooted in our minds by untold repetition both by word of mouth and by an uncritical press. The strange behavior of certain exotic snakes is popularly transferred to local species incapable of such action, as, for example, the spitting of venom which many American snakes are reputed to do, but which actually is restricted to the spitting cobras of Africa and Asia. I cannot comment on all the fallacies about poisonous snakes in the allotted space, so I shall merely mention and clarify some of the known truths concerning them and dwell on a few points not yet scientifically settled ; the many harmless species which are commonly considered poisonous will be disregarded altogether.

Poisonous snakes are not common in Illinois, nor are they common in any area agriculturally as well developed as this state. They would be expected to maintain themselves in rocky or marshy country that is relatively barren and consequently with but a small population. Such areas are relatively few in Illinois—the bluffs of the Mississippi River offering the primary exception, with smaller scattered marsh-lands and rocky country over much of the state generally too small to support snakes as consistently prosecuted as these. Two of the snakes (copperhead and cottonmouth moccasin) reach the northern limit of their western distribution in the center of the state, and are not found much north of St. Louis. In the northern half of the state the two rattlesnakes are found only in restricted "islands," such as the areas near Tonica and Galena. In the past these snakes were undoubtedly generally distributed over their range in the state, for early reports and county histories abound with accounts of their presence where they now exist no more.

Photographs of moccasin and copperhead by H. K. Gloyd; Figs. 1 and 6 by Oswald Boll, after Blanchard and Klauber respectively; Fig. 2 from Field Museum model; Figs. 3 and 4 by E. G. Wright, the latter after Tomes; Fig. 5 by D. D. Davis.



Copperhead

*Agkistrodon mokasen**

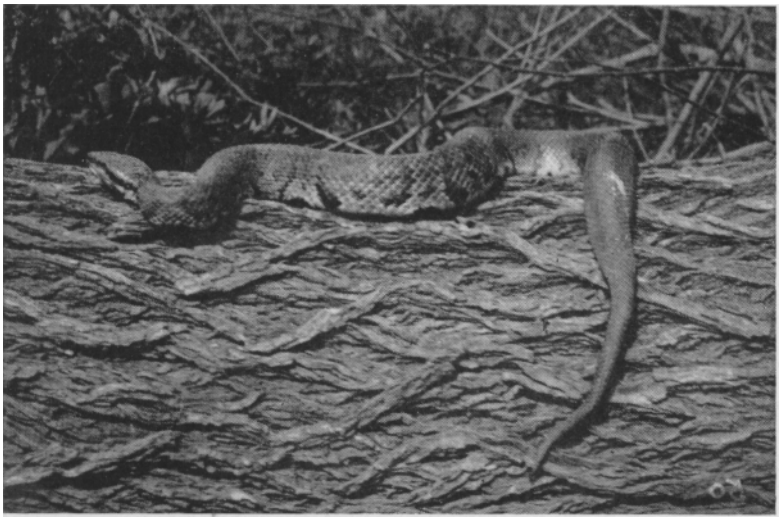
One of the three subspecies of the copperhead is found from Massachusetts south to Florida, and west to Illinois, Arkansas, and Texas. We have Illinois records from the following counties : Fulton (old), Jackson, Peoria (old), St. Clair, and Union.

The copperhead receives its name from its coppery coloration which is not restricted to the head alone but. is the predominant color of the whole animal. The light coppery ground color of the body is broken up by darker hour-glass shaped bands. In Illinois the harmless fox snake is frequently called a copperhead because the top of its head may be vaguely of a coppery color ; its dorsal blotches, however, are widest in the center—not constricted into the typical hour-glass shape—and are interspersed with smaller lateral spots. The copperhead seldom exceeds three feet in length.

The copperhead is most generally found in rocky wooded areas, although it seems to like the proximity of water, perhaps because of the greater abundance of food. Small mammals, birds, frogs, and even insects and their larvae form its major food.

Like most snakes, the copperheads mate in late spring and bear their three to ten young in early fall.

*Two subspecies of the copperhead, *Agkistrodon mokasen mokasen* Beauvois and *Agkistrodon mokasen cupreus* Rafinesque, occur and intergrade in southern Illinois. For the purposes of this paper no differentiation is necessary; anyone interested, however, may refer to the Bulletin of the Chicago Academy of Sciences, vol. 5, no. 7.



Cotton-mouth Moccasin

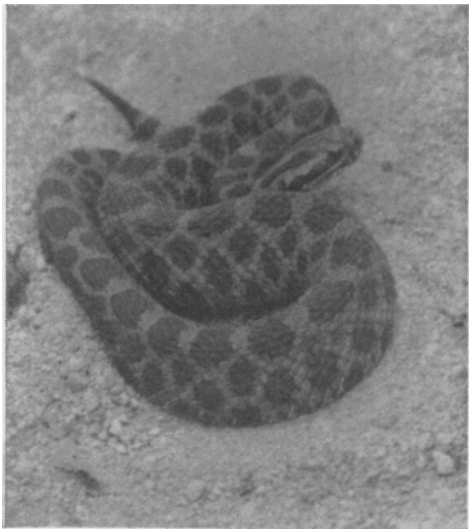
Agkistrodon piscivorus

The cotton-mouth is found from Virginia to Florida, west to Texas, and up the Mississippi Valley to Illinois. We have records from Alexander, Jackson, Union, and Wabash [?] counties in Illinois.

This species seldom has a well-defined or clear pattern which may be easily distinguished. It is a dark sooty-brown color with vague, dark-outlined bands. It is generally found at the muddy edges of streams, ponds, or marshes with the mud further obliterating the pattern, which, however, may appear quite clearly when it is swimming. The light stripes back from the eyes and bordering the upper lip are quite characteristic. In general coloration, as well as shape, the cotton-mouth resembles many species of harmless water snakes. It has been known to reach a length of four feet.

The cotton-mouth receives its name from the extremely white interior of its mouth which is frequently wide open, especially at the approach of any object which may be prey or enemy. It is seldom very far away from water—generally found sunning itself on partly submerged logs, overhanging branches, or the muddy banks of sluggish streams or ponds. Its primary food is fishes and frogs, although other vertebrates are also frequently taken.

On the average, eight young are born in the fall, although the number may occasionally reach fifteen.



Massasauga

Sistrurus catenatus catenatus

Found from. New York, southern Ontario, and Michigan southwest to Kansas. We have the following county records from Illinois : Cook, DeKalb, DeWitt, Edgar, Jackson, Knox, Lake, Madison, McLean, Mercer, Peoria, and Tazewell.

This small "pigmy" rattlesnake is distinguished from the true rattlesnake by the presence of nine large shields rather than many small scales on the top of the head. It is a gray color with a series of black blotches down the center of the back and two more or less distinct rows of black spots on the sides. Occasionally an almost black individual is found. It attains a length of three feet, although rarely a specimen will exceed that length.

Kennicott in 1855 considered the species abundant in Cook County, and it cannot yet be considered rare in the Chicago Region. Although primarily a denizen of marshy country, west of Chicago it is also found in comparatively dry prairie, being occasionally plowed up in the fields near Deerfield ; in the Indiana Dunes it is found in the more typical marshland.

The food of the massasauga seems to be primarily voles, although other rodents, birds, and frogs are also taken in the wild. Frequently they will refuse food in captivity—one specimen in the Academy did not eat for almost ten months.

Four specimens from the Chicago Region each gave birth to nine young during the middle of September.

Timber Rattlesnake

*Crotalus horridus**

Found from Maine to Georgia, west to eastern Texas, and up the Mississippi Valley to Iowa and Wisconsin. We have Illinois records from the following counties where it probably still occurs : Adams, Alexander, Coles, Fulton, Hancock, Jackson, Jo Davies, LaSalle, Monroe, Pulaski, Randolph, St. Clair, and Union. Robert Kennicott recorded the timber rattler from Cook County in 1855 and there is no reason to doubt its occurrence here at that time, but it has since been killed off over the greater part of the state, maintaining itself only in the remoter and wilder areas.

The coloration of the timber rattler is extremely variable ; the ground color is cream-yellow to a yellowish brown but may be much darker ; a reddish dorsal stripe may be present. The blotches are almost black, lighter in the center, and often bordered with a light buff. An exceptional individual of this species may reach five feet, although specimens over four and a half feet are rare. The timber or banded rattler is found in rocky woodland bluffs along some of our rivers and seems to require more cover than the other poisonous species.

This rattler feeds primarily on rodents, and therefore is quite beneficial. Seven to fifteen young are born in September.

HOW TO RECOGNIZE POISONOUS SNAKES

Except for the pits of the pit-vipers (which no other snakes possess), poisonous snakes can only be told from, harmless ones by the presence of poison fangs ; differentiating between large teeth and poison fangs, however, may be quite difficult, so that the only really good way to tell poisonous snakes is to *know the species* which are likely to be found in any particular locality. The photographs and descriptions of our four poisonous snakes at the beginning of this article should aid materially in getting acquainted with the only species found in the northern states east of the Mississippi River. Triangular heads, stout bodies, spotted patterns, hissing reactions, etc., are no criteria of poisonous species, for although *some* venomous snakes have these appearances, many harmless and beneficial snakes have them also.

WHAT IS A POISONOUS SNAKE ?

Any separation of biological forms, even that of animals and plants, is purely artificial and arbitrary. So it is with poisonous and non-poisonous snakes. All snakes, like mammals, have oral secretions (saliva, etc.) which are likely to be toxic because of the bacteria con-

*The subspecies *horridus* is found in northern Illinois, while *atricaudatus* is in the southern tip of the state, grading into the northern subspecies in Union and Jackson counties.

tained therein. The result of a bite from a snake so infected is the so-called blood poisoning, which although it may also have fatal results on rare occasions is not a criterion of poisonous qualities of the animal inflicting the bite (a mouse, incidentally, may be much worse than a snake in this respect) . Some species, called *Opisthoglyphs* or back-fanged snakes, are questionably poisonous in that they have special poison glands, although the venom is not very potent and the mechanism for injecting the poison is but poorly developed. These snakes are generally considered harmless to man, and will not be considered further here. The true poisonous types, called *Proteroglyphs* or front-fanged snakes, have well-developed mechanisms for injecting venom, and for the purpose of this short article will be considered as the only really poisonous snakes. Of over 2500 known species of snakes only about four hundred fall into this category ; they are further divided into four groups :

I. *HYDROPHIIDAE.* SEA SNAKES

These purely marine snakes, reaching a maximum length of eight feet, live in the warm waters of the Pacific and Indian Oceans. Their entire bodies, but especially their tails, are vertically flattened adapting them to live in water which they seldom if ever leave. They feed primarily on fish on which their poison acts very rapidly. According to some authorities, their danger to man is small because of their hesitancy to bite when out of water. Their fangs are immovable and placed near the front of the mouth. Only one species is found in North America where it is restricted to the Gulf of California.

II. *ELAPIDAE.* CORAL SNAKES, COBRAS, ETC.

Although in general a slender and harmless looking group of species, this is probably the most dangerous family of poisonous snakes. The cobras are well-known from fiction and sideshow lore as very dangerous, but the coral snakes are often assumed to be quite harmless—even in textbooks of zoology. As a matter of fact, however, the mortality from bites inflicted by these beautiful snakes was 75% compared to 12% in the case of rattlesnake bites. Their fangs, as in sea snakes, are stationary. Three kinds of coral snakes are found in the United States.

III. *VIPERIDAE.* OLD WORLD VIPERS

The common poisonous snakes of Eurasia and Africa are still maintaining themselves even in rather thickly settled districts, and are apparently little affected by civilization. They are thick-bodied in appearance, with the more or less triangular head which is generally

attributed to poisonous snakes, but is in reality no sign of a snake's venomous character. Their fangs, like those of our pit-vipers, are retractable when not in use.

IV. *CROTALIDAE.* PIT VIPERS

These are the typical new world vipers, also found in Asia, which include our well-known rattlesnakes, copperhead, and cottonmouth moccasin. They are distinguished from the old world vipers by a deep pit between the nostril and eye (fig. 1), which according to recent researches, is a sensory organ for temperature discrimination (which assists in locating and striking prey) and for detecting air vibrations. Thirty-five species and subspecies are found in North America, the largest of which (Florida diamond-back, *Crotalus adamanteus)* may exceed six feet in length.

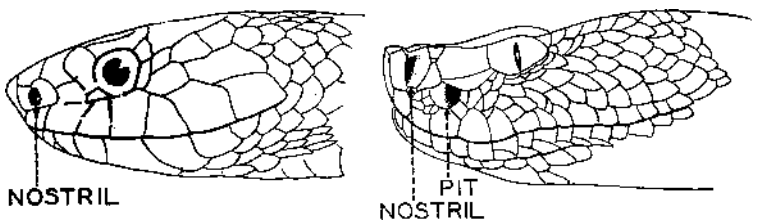


Fig. 1. Differences between the poisonous pit vipers (right) and our harmless snakes (left). Note the pit and the vertical pupil of the viper and the absence of pit and a round pupil in the harmless snake.

POISON GLAND

The poison gland is a paired organ, generally oval in shape, extending backwards just behind the eyes. Histologically it is very similar to the salivary glands of mammals—composed of spongy tissue with large alveoli. A duct extends from the anterior end of the gland over the maxillary bone, and terminates near the base of the fang. Although this duct is not actually connected with the fang, the venom must flow into the tooth since the connective tissue sheath directs the flow into the orifice of the fang.

VENOM

The venom is a clear, pale yellow liquid, somewhat viscous, similar to albumin with the addition of other substances. It is generally neutral or slightly acid in reaction. The knowledge of the chemistry and phar macology of snake venom is still in a very elementary stage, since it is difficult to analyze the highly complex proteins which compose the venom.

The primary constituents of the venom are *neurotoxins,* which tend to destroy or paralyze the nervous system, and *haemotoxins,* which destroy the red-blood corpuscles and thus prevent the carrying of oxygen to the various organs of the body. The elapine snakes are primarily *neurotoxic* while the viperids are largely *haemotoxic* in action.

TEETH

Reptilian teeth do not differ from each other as do the teeth of mammals ; all are round, sharply pointed, and long for their width. The number is large—about 150 in our common water snake—and the teeth are replaced whenever lost. Snakes have four tooth-bearing bones, three (maxillary, palatine and pterygoid) in the upper jaw, and one (dentary) in the lower. The reduction of the number of teeth from a non-poisonous to a dangerously venomous snake is rather striking : in the water snake (fig. 5) all four bones are fully supplied with teeth ; in an opisthoglyph all bear somewhat fewer teeth; while

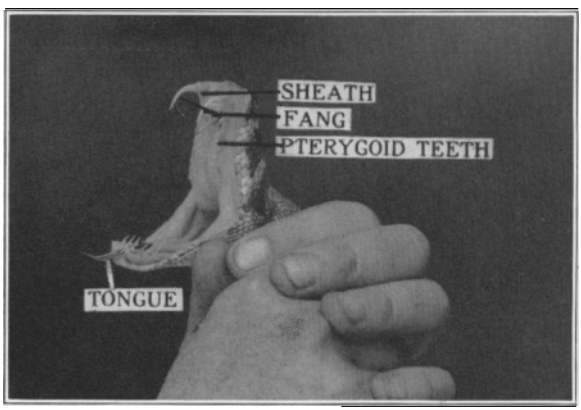


Fig. 2. Model of a rattlesnake's head.

the need for teeth has been radically reduced by the efficient poison mechanism of the rattlesnake, so that it retains only one tooth each in the maxillary and palatine, while about a third of the original number are retained in the dentary and pterygoid.

POISON FANGS ARE MODIFIED TEETH

Only one pair of teeth is modified to inject venom. In vipers these teeth are situated on the maxillary bone and are typical reptilian teeth, enlarged to a greater or lesser extent, and provided with a device for injecting venom (figs. 3 and 5). The rattlesnake fang is similar to a hypodermic needle, having a large opening near the base for the connection with the venom, duct and a slit-like orifice near the tip. This tube, however, is the end-step of a long evolutionary development of

the fang. In most opisthoglyph snakes only a shallow groove or trough is present ; in elapids, this groove may be only slightly deeper, almost closed, or, as in the cobra, entirely closed. So in formation it is not really a tube through the tooth but the closing over of a trough formed in the tooth. This fact is indicated not only by the comparison of the fangs of different snakes but also in the development of the individual fang of the rattlesnake as shown in figure 4. All fangs, like the regular teeth, are ankylosed to the bone. In the case of sea snakes, cobras, and their allies these bones are virtually stationary but in the vipers the bone itself is capable of movement, producing the illusion that the tooth moves. A sheath of mucous membrane covers the fangs when they are laid back, but easily slips out of the way when they are erected (fig. 2).

Fig. 3. Rattlesnake fang, showing opening for duct at the top, and the slit like orifice near the tip.

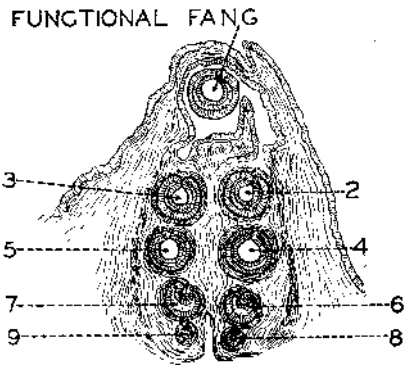


Fig. 4. An enlarged section through the fang region of a rattlesnake, showing the fuctional fang and eight replacement teeth in various stages of devel opment.

REPLACEMENT OF FANGS

All reptilian teeth are replaced an innumerable number of times ; in the case of fangs a considerable number of replacement teeth in different stages of development are already formed (see fig. 4), and one is normally ready to function as soon as a functional fang is lost. This "shedding" of fangs occurs at regular intervals varying in different species from three to six weeks, although a tooth may be lost at any time in various ways.

The figure (4) shows a cross section in the region of the fangs shortly after a pair has become functional. Fang number two will move down and take a position beside the functional fang and will presently he ankylosed to the maxillary bone through the ossification of connective tissues as well as the secretion of cement. The connection of the functional fang with the bone in the meanwhile will be

resorbed so that the tooth will be loose when the replacement fang (number two) is ready to function. The orifice connecting with the duct of the poison gland faces inward or outward as the fang is on the outer or inner part of the maxillary, so that the duct remains in the same position.

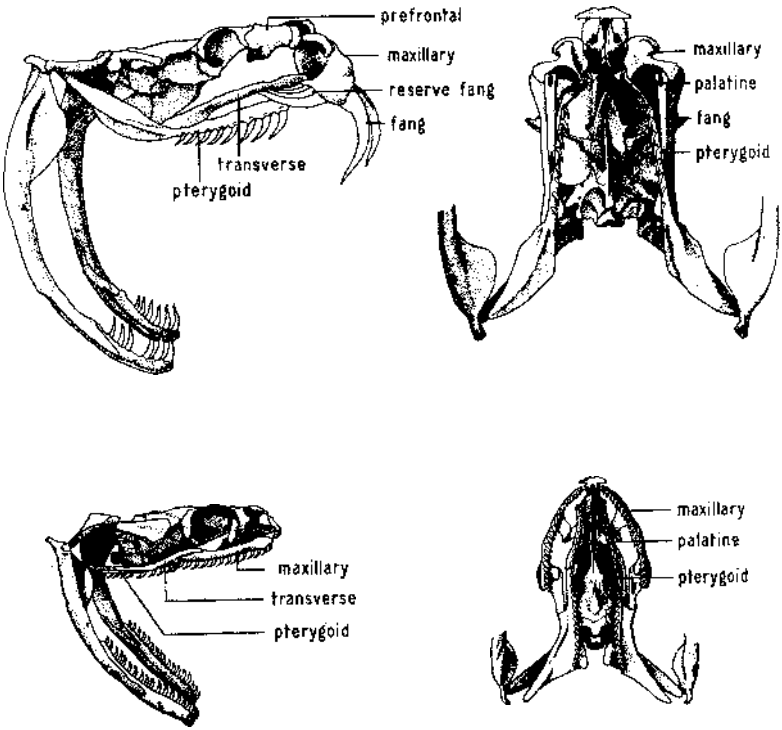


Fig. 5. Skulls of the rattlesnake (above) and a harmless snake (below) showing the main differences in dentition.

STRIKING MECHANISM

The mechanism involved in striking is quite complex. but constant reference to figure 5 will clarify the following description. The snake must first be in a position so that it can strike, but it must be remembered that a snake need not be coiled before striking, as is commonly supposed, for it can turn its head to strike in practically any direction. Probably no object farther away than three-fourths the length of the snake can be struck and for most species the distance is less. In hurtling the forepart of its body forward, the mouth is opened. A group of muscles (spheno-pterygoid) pull the pterygoid bone forward. This motion is transferred to the transverse and palatine bones to which

the pterygoid is attached. The maxillary, being hinged to these, is pushed forward and upward, pivoting on the lachrymal which also is capable of some movement. Since the fangs are firmly fastened to the maxillary this throws them forward—ready to strike. Muscular com- pression of the gland, as well as the impact of the fangs against the prey, forces the venom through the teeth into the wound. The fangs are withdrawn, and retracted by another set of muscles (pterygoid and spheno-palatine) , the mouth closed, and the snake resumes a striking attitude, waiting for the prey to die so it may be eaten.

The movement of the fangs is not automatic with the opening of the mouth but is entirely a volitional act. The snake can move its fangs individually or together without striking, as may be observed in a captive specimen. If the viper should miss its aim its fangs are diverted sidewise when the mouth closes so as not to pierce the lower jaw. The impact of such a misdirected blow sometimes causes the venom to spurt a considerable distance. No American snake, however, "spits" its poison, although some cobras do, aiming regularly, it is reputed, at the eyes which easily absorb the poison into the system.

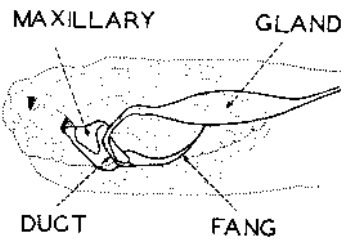


Fig. 6. Relative positions of the maxillary bone with its poison fang, and the venom gland and its duct.

PROTECTION AGAINST POISONOUS SNAKES

Protecting a community against ophidians by attempts at extermination is generally quite futile. Bounties are frequently offered for poisonous snakes, but such measures do not seem to cut down the number of snakes. In one European municipality where bounties were paid, the numbers of snakes brought in increased steadily for thirty years with the exception of a period during a war and two years when the bounty was reduced ! Aside from apparently not reducing the number of poisonous snakes the bounty system tends to dishonesty and to ignorant destruction of harmless and beneficial species. Intro- ducing animals which feed on snakes has the same effect of destroying economically important species, and the introduced animals may prove more destructive than the snakes. An excellent example is the intro- duction of the mongoose into the West Indies to kill off snakes ; many

snakes were killed and some species practically exterminated, but the mongoose is now the worst enemy of poultry in the West Indies and probably does much more damage than the snakes ever did. To kill off a colony of rattlers in an Illinois State Park hogs were turned loose in the snake infested area. Hogs, of course, will eat anything, even snakes, but doubtless prefer more luscious wild flowers, ferns, etc. Such a procedure is certainly against any conservational principle and should be discouraged—unless the only object is to feed the hogs! The only measure that can be taken, unless the snake dens are found and destroyed by a trained individual, is personal protection. Warn- ing signs keep people alert, and there is little cause for worry if proper precautions are taken. The snakes are certainly the most anxious to get out of the way in case of an encounter.

Since our snakes cannot bite through thick leather, an individual can best protect himself from bites by wearing boots or leather puttees when in country inhabited by poisonous snakes. This, of course, is not complete protection, but over seventy-five per cent of all bites are below the knee and would be rendered ineffective by proper leg-gear. Long pants or slacks afford additional protection by deflecting the aim of the snake, particularly when worn over boots or high shoes.

IMMUNITY TO SNAKE POISONS

Some people, mostly side-show fakirs and "nature healers," etc., claim immunity to snake venom. Although this generally is a bid for publicity, immunity may be gained by repeated bites which have in- jected sub-lethal doses of venom. It is important to remember, how- ever, that immunity to the venom of one species does not give im- munity to other venoms.

Various animals may be relatively immune to snake venoms. The hog and mongoose among many others probably are not really immune, but are well protected by a thick layer of fat which does not readily conduct venom into the circulatory system. Some non-poisonous snakes may not be affected, but the exact status of the immunity of harmless snakes, and even of poisonous snakes to their own venom, is at present very questionable. Experimentation being carried on by many workers has not yet been able to give an exact answer, for there have been many divergencies in results. There appears to be some good evidence, however, that poisonous snakes are not entirely immune to snake venoms—not even to their own.

FOLK LORE IN SNAKE BITE CURE

There is probably no greater wealth of misinformation in folk lore than that part which deals with snake bite cures. All countries, even most communities, have their own pet remedy for snake-bite. These comprise practically everything—from herbs and "snake stones" (ani-

mal charcoal compound) to frog skin and alcohol. Some of these do have some power of absorbing venom but have failed in all carefully checked experiments. Whiskey and other alcoholic drinks are absolutely detrimental to recovery in snake-bite because they tend to speed up the distribution of the venom through the system. When there is recovery with whiskey in quantity, as there has been, there would have been recovery without it.

SNAKE BITE TREATMENT

Since the venom can act only if it is spread through the organism by the circulatory system, it is necessary in order to effect a cure to prevent its spread, to remove the venom, or to neutralize it—or, preferably, to apply all three methods. The application of a tourniquet prevents the spread ; due to the researches of Dr. Dudley Jackson an efficient and simple suction apparatus which effectively removes much of the venom has been placed on the market by several companies ; many substances will neutralize snake venom *in a test tube* (for example, potassium permanganate) but are totally ineffective in a snake-bite case—antivenin or serum prepared from the venom itself is the only proven effective substance for neutralizing venom.

It should be remembered that the suction-method developed by Dr. Jackson, used alone, has saved almost all animals in carefully controlled experiments even though they received injections of venom more than sufficient to kill them. The remarkable records of recovery by the application of suction are ample proof of its *primary* importance in the treatment of snake bite.

WHAT TO DO IN CASE OF SNAKE BITE

1. Kill the snake. Knowing the species is often helpful in treatment and killing the snake prevents the possibility of another member of the party being bitten.

2. Keep quiet. Do not run, get excited, or do anything to speed up circulation.

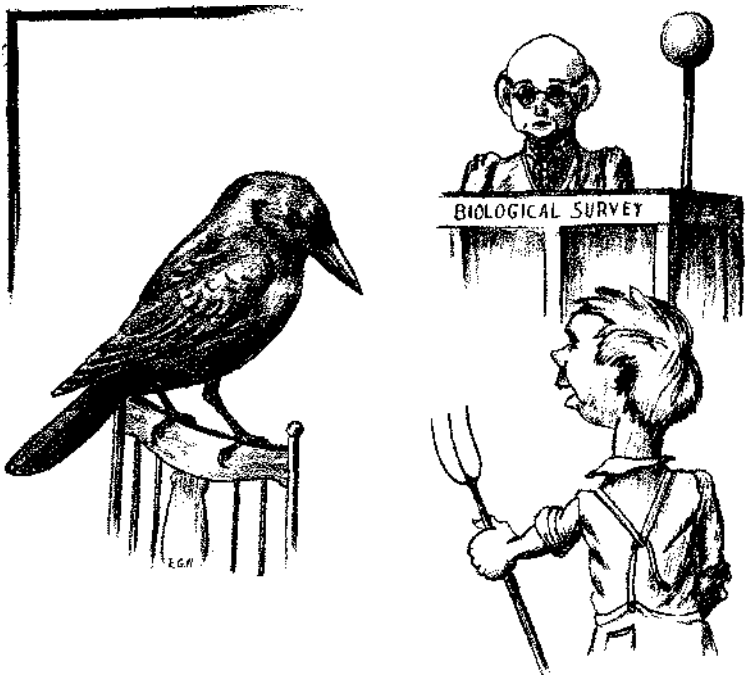
3. Apply tourniquet between the bite and the heart. Do not tie it too tightly and release it for several minutes every 25 minutes.

4. Sterilize area around bite and make several deep (1/4 inch) incisions through both fang marks.

5. Apply suction. The suction cups supplied with several standard snake kits are recommended. If these are not available, suction by mouth is perfectly safe if there are no sores on mouth or lips, for the venom is not a stomach poison.

6. Get a doctor or get the patient to a hospital as soon as possible, *continuing the suction.*

7. Inject antivenin into the area surrounding the bite. Suction should be resumed an hour after injection of antivenin.



The People vs. Corvus

SAMUEL A. HARPER

ALTHOUGH it is not generally known, the United States government maintains a bird court. The court is called the Biological Survey and it is a Bureau of the Department of Agriculture. It collects its evidence carefully and its decisions are accepted as final. Some years ago the whole Corvus family was arraigned and tried for its life before this court.

On behalf of the crow I plead the defense of "double jeopardy." He has already been tried by the bird court and on no count of the indictment has he been condemned to death.

As for man himself, he insists that he shall not be put in jeopardy twice for the same offense but he is not willing to extend the protec- tion of this principle of the law to the friendless crow. If it be replied that it is a new and different crow in each case and that, therefore,

the rule of "double jeopardy" does not apply, it may be answered that at least the doctrine of *stare decisis* is applicable and the decision of the Biological Survey should be followed in each case. But regardless of these wholesome principles of the law, man periodically rises and demands the extermination of the entire crow family.

But the old earth was not made for man alone. He is just one of nature's experiments, like the crows. He is no more entitled to what he can get than the crow is. Each has his right to existence. In his life struggle man attacks the crow but he should not carry the fight to the point of extermination because, after all, the crow has a right to live or he would not be here.

At one time the farmers of the west killed large numbers of hawks because of their supposed depredations among young chickens. Shortly thereafter these same farmers were overwhelmed with prairie dogs. The same bird court, the Biological Survey, was called in and it promptly informed the farmers of the mistake they had made.

As already stated, the Biological Survey in hearing the charges against any bird, takes infinite pains to get at the facts and upon the trial of the Corvus family the evidence presented by the prosecution was about as follows : It was shown that the crow was very fond of corn and frequently went up and down the corn rows, pulling up and eating the swollen kernels which had been planted. It was also shown that it ate corn which had partially matured in the ear, causing some of it to spoil, and that it also stole corn from the shock.

It was further shown that the crow was particularly fond of the eggs of domestic fowls and also of other birds and would frequently break up nests and sometimes even eat the young of other birds. Attention was even called to the fact that the crow presented a melan- choly appearance and, therefore, should be regarded as an evil omen.

At about this stage the prosecution rested and the court began a careful investigation of the charges made. In order to do this thor- oughly a field force was sent out for the purpose of collecting crows in order that experts might examine their stomachs and learn exactly what they ate. Over two thousand crow stomachs were examined carefully over a period of five years. This investigation showed that the crow did eat large quantities of corn and that in some sections of the country it annoyed the farmer greatly but that most of the harm it did to the corn crop could be remedied by replanting. It was admitted that the charge as to damage done to the eggs and nests of other birds was true.

The examination of the crows' stomachs, however, revealed the presence of many insects. It appeared that they eat many grubs and beetles and vast quantities of grasshoppers and the court knew that it is always a close race between the grass and grasshoppers as to

which will survive. The stomachs also contained many caterpillars and it was found that this insect was a favorite food for baby crows. Great quantities are fed the young while they are in the nests and it was estimated that every little crow eats three times its weight in caterpillars during the time that it is being fed by its parents.

Upon this evidence the Biological Survey, sitting as a Federal bird court, refused to condemn the crow to death. The answer was, and still is, that the crow is a local problem. The benefits which he brings to man are general, especially in the eating of large quantities of insects, but the damage which he does is limited to certain areas. The corn farmer is justified in killing a crow (when he can !) and in the corn growing sections of the country the Corvus family should not be permitted to become too numerous. As everyone knows, there are vast areas where no corn is grown, and in these sections of the country the crow is of great benefit to man.

If the partial destruction of crops is to mark a bird for capital punishment, then many of our favorites are doomed. The robin, which is unquestionably one of America's favorite birds, does heavy damage to cherries and other growing fruit. The bobolink, so much admired in the north, is a heavy destroyer of rice in the southern fields and is there regarded as a nuisance. Even the little house wren, the pet of almost every dooryard, is a pernicious destroyer of the eggs of other birds.

Man, in his vanity, considers many things which nature produces as his exclusive property. All things were not made for man. If this were so, it would be difficult to account for rattlesnakes, poison ivy, and a thousand other things which are of little use to man.

I once heard of a Massachusetts gentleman who maintained his cherry trees for the exclusive benefit of the robins. If they did not eat all of the cherries, he took what was left. He considered the fruit more valuable as food for the robins than for any other purpose. It all depends upon the point of view.

Mischievous birds that steal grain or fruit always incur the enmity of that class of conscientious people who cut down their fruit trees that the boys may not be tempted to break the eighth commandment.

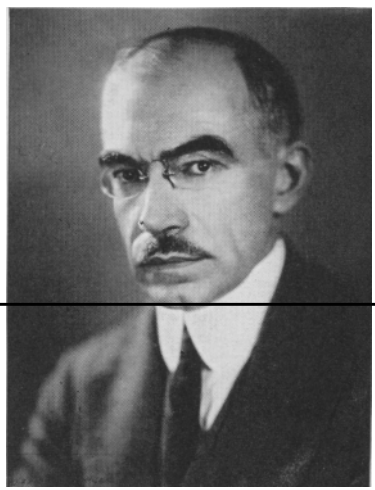
The respect shown to birds by any people seems to bear a certain ratio to the antiquity of the nation. The rook, which is the European representative of the Corvus family, is protected by the farmers because of his destruction of insects which are far more harmful than birds. Birds are regarded as sacred in Japan, where the population is so dense that the inhabitants would not consent to divide the products of their field with the feathered race unless their usefulness has been demonstrated.

Robert Burns Wilson even makes the crow the subject of a graceful and befitting sonnet :

"Bold, amiable, ebon outlaw, grave and wise!
For many a good green year has thou withstood—
By dangerous, planted field and haunted wood—
All the devices of thine enemies,
Gleaning thy grudged bread with watchful eyes
And self-relying soul. Come ill or good,
Blithe days thou see'st thou feathered
Robin Hood!
Thou mak'st a jest of farmland boundaries.
Take all thou may'st, and never count it crime
To rob the greatest robber of the earth,
Weak-visioned, dull, self-lauding man,
whose worth
Is in his own esteem. Bide thou thy time;
Thou knowest far more of Nature's lore than he,
And her wise lap shall still provide for thee."

Adolf Carl Noe

1873-1939



In the death of Dr. Adolf Carl Noe on April 10, 1939, American geology and paleobotany have lost a devoted leader. Born in Austria on October 28, 1873, and educated in part at the universities of Gratz and Göttingen, he came to the United States at the age of 26, and soon became a naturalized citizen. During his student days at Gratz he had developed an interest in paleobotany, and had been a demonstrator in paleobotany in that institution from 1895 to 1897. On coming to America, he withdrew from the field of science, and filled several positions in modern languages and literature before he came to Chicago. He received an A.B. degree at Chicago in 1900, and the Ph.D. in Germanic Languages and Literatures in 1905. Before he attained his

doctorate he had been appointed to an assistant professorship in his major department in 1903. It was as a student of German under his guidance during 1903-04 that I first knew him, and I have many happy memories of my class room experiences with him. He continued his connection with the Department of Germanic Languages and Literatures until 1923.

In the meantime he had not forgotten his early interest in paleobotany, and the broader aspects of geological and botanical science. He was transferred in 1923 to the Departments of Geology and Botany, developed courses in paleobotany, and served these departments faithfully for 16 years. In the field of paleobotany particularly he distinguished himself by discovering coal balls in the American coal fields, by becoming one of the most active and enthusiastic collectors of paleobotanical material in the country, and by developing new methods of studying paleobotanical materials, especially the nitro-cellulose peel method of making microscopic sections of coal balls.

He was associated with various state geological surveys, particularly in Illinois, Iowa, and Kentucky ; and in 1927 he was a member of the Allen and Garcia Coal Commission to Soviet Russia. He performed valuable services, especially in the Donetz basin. His main scientific contributions were several books : *The Fossil Flora of Northern Illinois; Ferns, Fossils and Fuels;* and a text-book on coal ; besides these he published numerous scientific papers in geological and botanical journals.

His leadership in paleobotany was recognized when on December 30, 1936, the Botanical Society of America at Atlantic City organized a paleobotanical section, and chose Dr. Noe as its first chairman. Curator of fossil plants in the Walker Museum of the University of Chicago for many years, he became honorary curator of paleobotany of the Chicago Academy of Sciences in 1930, and in 1934 a research associate of the Field Museum of Natural History. It was under his direction that the great reconstruction of a carboniferous forest was prepared at the Field Museum.

Dr. Noe was a member of many learned societies here and abroad, and had been honored and decorated for his many scientific and hu- manitarian services after the world war. He was a man of kindly spirit, with a keen sense of humor which he used with telling effect in recounting his exploits as traveller and collector.

He had suffered a paralytic stroke on March 11, 1939, and had improved sufficiently to be at home when the end came as he slept. He is survived by his wife and two daughters, and will be greatly missed by the host of friends who loved and respected him and enjoyed his genial friendship.

—Charles A. Shull

Photograph by G. R. Pierce

The Natural History of Starved Rock State Park

DONALD T. RIES* AND MAY DAVIS RIES

IN Starved Rock State Park the State of Illinois possesses one of the most interesting and varied regions to he found within its borders. The park consists of a long narrow strip of wooded bluff land along the south bank of the Illinois River in LaSalle County, roughly five miles long and one-half mile wide and enclosing in all about 1000 acres. The towering cliffs which rise above the river and form the narrow gorges reaching back from it are made of the same St. Peter Sandstone which underlies most of Illinois but which rises above the surface of the ground only in a few places within the state.

The geological development of the park region may readily be interpreted from the clear marks left upon the terrain. During Paleozoic time the region was covered by a vast inland sea which deposited thick layers of sand. These layers later were formed into the soft sandstone we find today. Some pressure from beneath the horizontal layers caused them to arch to the surface, and it is at the highest point of this upfold, called the LaSalle Anticline, that the park is located.

In a later period the Kankakee Torrent from the area near the present city of that name (and followed shortly by the Valparaiso Torrent breaking through the natural barrier at the southern end of glacial Lake Chicago, approximately where Lake Michigan now lies)

*Park Naturalist, Starved Rock State Park.

swept southward and gouged out a course which roughly corresponds with the present Illinois River Valley. The strong current left the sheer sandstone cliffs bare at each side, much as we see them today. Streams at each side of the torrent, and flowing into it, fell over the cliffs to the lower level of the river and gradually wore deep canyons in the soft sandstone. At the end of each of these canyons is a cliff which in wet seasons boasts a small waterfall. Remains of former plunge pools are seen in a number of the canyons and the cliffs and canyon walls show abundant evidence of old water levels. In addition, uneven weathering has marked the cliffs and caused some of them to assume fantastic shapes. All of them are interestingly colored by mineral deposits.

Ranging from high dry woods and steep sandstone cliffs to narrow, shadowy gorges and wet lowlands, the wide variation in habitat in this comparatively small area provides for an equal diversity in the wild life. At the present time the wild life of the park is characterized more by the number of species to be found than by large numbers of individuals of any one species, a condition probably brought about by the long popularity of this park and its accessibility to visitors. In spite of recent efforts the numbers of many species are constantly decreasing, and, unless sufficient public sentiment can be aroused to protect them, certain species may soon disappear altogether. Only by constant endeavor and the sincere cooperation of the public will the existent fauna be conserved.

During the winter the wooded slopes and canyons of the park provide food and shelter for some of our most interesting birds. The cardinal, tufted titmouse, white-breasted nuthatch, chickadee, and junco are commonly seen, while the woods resound to the cries of the bluejay and the drumming of downy, hairy, and red-bellied woodpeckers.

At the time of the spring and fall migrations of waterfowl the stretch of the Illinois River adjacent to the park is host to huge flocks of cormorants, lesser scaups, canvasbacks, and coots, with smaller numbers of wood ducks, shovellers, redheads, and American mergansers among others. Loons are often observed on the wooded pond at the west end of the park near the river. A little later in the season the shy pied-billed grebe is seen on the quiet lagoon at the east end of the park where muskrat houses are visible among the cattails. Nearby red-winged blackbirds call, meadowlarks sing, and the belted kingfisher digs his home in the river bank. About the first of May songs and twitterings of myriads of migrant warblers are heard in the woods in the early morning and the calls of veery, phoebe, wood pewee, catbird, brown thrasher, and several vireos are heard throughout the day. In the distance the sad cry of the mourning dove is often

heard. Occasionally while tramping through the canyons one will flush the woodcock, a game bird seldom seen in this region.

Throughout the year the raucous calls of the crow, barred owl, great horned owl, and screech owl may be heard and hawks of many kinds are often seen circling overhead or perched on some vantage point.

The park abounds in smaller animal life, although the larger mammals are no longer to be found here. Moles, opossums, raccoons, muskrats, deer mice, flying, gray, and fox squirrels are common. An occasional skunk is encountered. There are no poisonous snakes in the park, although rattlesnakes have been found in a limestone area just outside of its boundaries. Garter snakes, hog-nosed snakes, milk snakes, and blue racers have been found, but are not common.

But it is the flora of the park that is most worthy of note. The shadowy recesses of the canyons and their damp walls are carpeted and papered with velvety mosses and liverworts. Ferns grow wher- ever they may find a foothold and sufficient moisture—in the rich bottoms they grow luxuriantly. The forest cover varies from the thick luxuriance of the lower levels where there is much moisture to a sparse, dry, weatherbeaten growth on top of the more exposed cliffs. The principal trees to be found are black, white, red, and bur oaks, white pine, ironwood, maple, elm, and hickory, interspersed with sas- safras, cedar, sumac, shadbush, and an occasional redbud. In one or two very exposed locations the rare American yew is to be found. Catbriar, poison ivy, and honeysuckle form impenetrable thickets in damp places.

In the spring many wild flowers bloom in the park. Skunk cabbage, jack-in-the-pulpit, and marsh marigold are plentiful in the moist low- lands ; hepatica, wild geranium, Dutchman's breeches, bloodroot, and trillium are found on the slopes. They are followed by a succession of violets, adder's tongue, turtle head, hibiscus, mallow, and anemones of several kinds. Delicate harebells clinging precariously to crevices in the cliffs are not uncommon. A few orchids occur. Later in the season Indian pipe and coral root, the saprophytic orchid, are common, while a few gentians may be found. In the fall many species of asters and of goldenrod lend color to the woods and trailsides.

A preliminary survey of the flora of the park was published by Thone in 1925* and a more comprehensive one is now being carried on. Already 142 species have been added to the list reported by Thone.

Because of popular interest in the natural history of Starved Rock State Park, the Department of Public Works and Buildings of the State of Illinois has stationed a full time naturalist in the park to lead conducted tours for visitors.

*Trans. Ill. Ac. Sci., vol. 17, pages 100-106.

MUSEUM ACTIVITIES

The 1939 Annual Meeting

The Eighty-second Annual Meeting of the Academy was held in the auditorium on April 10. The President's address of welcome was followed by the reports of the Treasurer, Secretary and Director.

The following officers were elected: Dr. Nathan S. Davis, III, President; Tappan Gregory, First Vice-President; and Fairbank Carpenter, Second Vice-President. Dr. John R. Ball and Dr. James C. Simonds, Scientific Governors, and Dr. F. R. Dickinson, Trustee, were re-elected.

The guest speaker was Dr. Fay-Cooper Cole, Chairman of the Department of Anthropology of the University of Chicago, who described his researches on primitive man and aboriginal culture in Illinois under the title " Rediscovering Illinois."

Reference Library

Our reference library, which has only recently been made available to members of the Academy, is already being used to a considerable extent. Numerous contributions of books and pamphlets have been made by the staff as well as other friends of the Academy. Almost one hundred pamphlets, a twenty-six year run of the *Oologist* which has been greatly desired by the library, and shorter runs of the *Auk, Bird Lore,* and the *Wilson Bulletin* which will be extremely valuable as exchange material, were received from Edward R. Ford. It is hoped that other Academy members and friends will keep in mind the needs of our two libraries, the scientific and the children's, and offer suitable material whenever possible.

Edward R. Ford

For almost eight months the Academy has had the pleasure and benefit of Edward R. Ford's presence. Our honorary curator of ornithology has now returned to Newaygo, Michigan, for the summer, after doing much to im- prove the egg and bird collections of the Academy, arranging an exhibit of nests and eggs, and writing copy for numerous bird labels and leaflets. The staff is looking forward to Mr. Ford's return in the fall.

New Leaflets

Three numbers have been added to the leaflet series, which we started last year with the assistance of W. P. A. printers. These leaflets are for free dis- tribution and are designed to assist the amateur naturalist of the Chicago Re- gion to know the local fauna and its literature, and to direct his attention to other phases of natural history.

Bird Houses by Edward R. Ford gives hints on the size and height of houses for various species which might be attracted. *How and Where to Collect Spiders* by Donald C. Lowrie might suggest a fascinating new hobby. *Dates of Arrival of Spring Migrants* is a calendar of birds abstracted from *The Birds of the Chicago Region* and has proven especially popular.

Field Work

During the spring months of this year several valuable additions have been made to the systematic collection of birds of the Chicago Area located in the north end of the third floor of the Museum. General field work for collect- ing accessories and specimens for new habitat groups has been carried on by Earl and Thurston Wright. Walter Necker and Donald Lowrie have continued studies of dune bionomics.

Dr. and Mrs. Gloyd left recently for the Brownsville, Texas, region where they will pursue field studies in the Lower Valley of the Rio Grande. The special objective of the trip is to collect specimens of certain reptiles and insects which occur in the United States only in that area. They expect to visit naturalists, collectors, and correspondents of the Academy in various southern states.

Dr. Gloyd gave the annual public lecture of the Illinois State Academy of Science at Springfield on the evening of May 5. The title of his address was " Animal Life of Arizona Deserts."

Walter L. Necker has recently received a Carnegie Grant-in-Aid for foreign study through the American Association of Museums. He expects to visit a number of European museums this fall for the purpose of studying methods of exhibition, museum organ- ization and technique, and consulting bibliographic sources in connection with the herpetological bibliography on which he has been at work for several years.

Museum Exhibits

Among the least known of our common birds, the warblers which fill the tree tops of our woods and parks with feathered gems of color during the spring migration are a source of both joy and despair to the bird student. Chapman has said of them, "The very essence of the season is in their flitting forms and lisping voices ; without them May would seem a dreary month and the migration of birds lose half its charm." Their coloration, their quick movements, their habit of staying mostly among the thick foliage high above the ground, and the fact that many remain with us only a few days at most, all contribute to the difficulty of making their acquaintance. Rare is the bird student who really *knows* the warblers.

In order to help those who wish to become more familiar with this interesting family of birds, the Academy has prepared an exhibit of the warblers most commonly found in the Chicago Area. This new display is temporarily located in the Museum lobby where it may be conveniently studied by all visitors during the height of the warbler migration. Examination of these well prepared specimens will help to fix in mind the characters most useful in the field.

The exhibit of apparatus and material for collecting insects has attracted con- siderable comment during the past several weeks. So much interest has been indicated that the display will be main- tained indefinitely, but transferred to the second floor to make room for the next of a series planned for the center case in the Museum lobby.

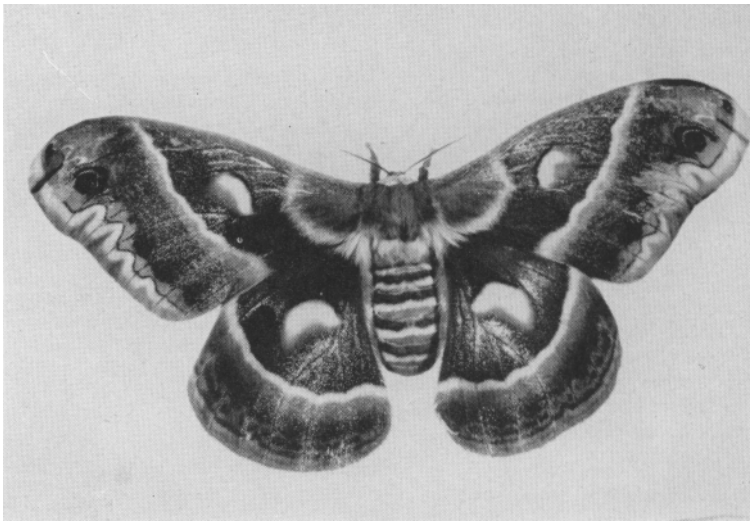
New Members

The following were recently elected to membership in the Academy :

Associate

Norman Bergendahl
Robert Burton
James Coldren
Fred M. Davis
Paul E. Downing
Joseph L. Dvorak
Vera Y. Foster
Arthur A. Gauchet
Reverend George M. Link
Emil J. Rokosky
Mrs. J. Benton Schaub
Karl P. Schmidt

An institutional subscription to the Naturalist has been extended to the Morton Arboretum at Lisle, Illinois.

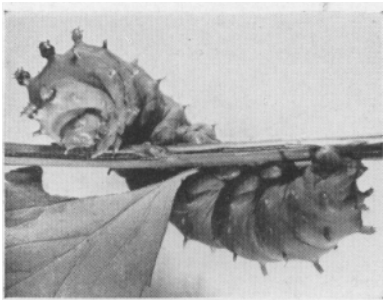


The Cecropia Moth

The cecropia moth *(Samia cecropia),* one of the largest of the family Saturniidae or giant American silkworms, is also one of the most common and interesting of our moths. A little known creature of the night, it arouses much interest when seen at close hand. Many who have captured one of these beautifully colored moths for the first time believe they have a specimen "new to science" or a " very rare" moth to say the least. Little do they realize that this beauty hatched from that ugly green caterpillar or "worm" which ate the leaves of their lilac bush or small apple tree.

The order Lepidoptera, which contains butterflies, moths, and skippers, receives its name from two Greek words : *lepes,* a scale, and *pteron,* a wing, because its members have their wings covered with tiny scales which give them color and pattern. These tiny scales overlap much as do the shingles on a roof. Lepidoptera pass through a complete metamorphosis. The adult female, after mating, lays eggs on a food plant. The young larvae begin feeding on the leaves soon after hatching. After the larval period of feeding they change into the pupal or inactive stage. In time the adult emerges to start a new generation.

No other large moth is as easily



A full-grown larva

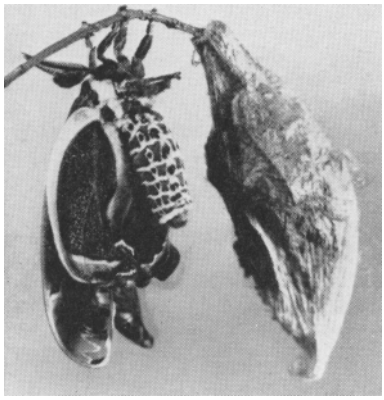
raised as the cecropia, either from the eggs, larvae, or cocoons. The large green larva with rows of red, yellow, and blue tubercles on the back and sides, feeds on willows, maples, lilacs, and many other trees and shrubs. The dwarf willow seems to be a favorite in the Chicago Area.

A simple rearing cage can be made of an aquarium with a glass cover or a tight wooden packing box with a hinged cover of ordinary window screen. On the bottom of the cage keep a layer of moist sand about an inch deep and a small jar of water. Willow branches or some other plants will provide food, but need to be replaced daily as the leaves wilt. If placed in the moist sand, willow branches will root and will not have to be replaced as often. The larvae, when fully fed, will spin their cocoons on the under side of twigs in the fall.

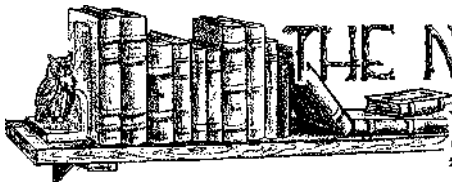
They pass the winter in the cocoons and hatch in the spring. If males and females hatch at the same time, they will mate in the rearing cage in a night or two and the females will lay their eggs. Then both sexes die, as cecropias live only a few days and do not eat. If only females appear, males may be secured in May or June by placing the cage with females in it at an open window at night. Many males will come to the cage attracted by an odor produced by the females. To have the adults hatch early the cage of cocoons should be kept in a warm place ; to hatch them later in April or May, they should be kept in a cool place. If you wish to raise the larvae it is better to have them hatch in April or May when food plants may more easily be obtained.

A number of cecropias were raised from eggs at the Trailside Museum. The second week in May four females and three males hatched and mated the second night, after which the males died. The females laid their round yellow eggs promiscuously in the cage, though wild females lay their eggs on the underside of leaves of food plants. In a few days the females also died. Nineteen days later the eggs hatched into tiny larvae about a quarter of an inch long. Their heads were large and black ; the body was dark gray with long gray hairs on each segment. They began feeding voraciously at once. Some devoured willow leaves, others seemed to prefer the leaves of lilacs. After about two weeks, the skin was shed. It split down the back and the larva, with a new skin underneath, crawled out and continued feeding. During the second and third molts it became quite green and much larger. One more molt and it was almost four inches long, about as big around as one's finger. Then, in Au-

(Continued on page 62)



The moth a half hour after emergence.



THE NATURALIST'S BOOK SHELF

The books reviewed in this section may be consulted in the Academy reading room and may be purchased through the Academy.

HOW TO KNOW THE INSECTS

Revised edition. 140 pages, 254 figures. 1939.

LIVING THINGS HOW TO KNOW THEM

164 pages, 434 figures. 1939.

By H. E. Jacques

Mt. Pleasant, Iowa; H. E. Jacques, cloth binding, $1.80; spiral binding $1.00.

These two small volumes hold a wealth of information for the beginning taxonomist. The book of insects (first published in 1936, now in its fifth printing) begins with several pages on general entomology, places to collect and methods of collecting, preserving and displaying of insects. The main body of each hook is occupied respectively with keys to orders and families of insects and with keys to phyla, classes, and orders of plants and animals. Both books contain instructions for use of keys, a glossary and index combined, and references to more comprehensive works. Added to the keys to animals and plants is a list of 107 suggestions for nature study projects which should be very useful to teachers in stimulating interest in living things. Also included is a list of the plant and animal orders with rather conservative estimates of the number of species in each. These books are furnished in two bindings, the spiral type being very useful as it enables one to lay the book out flat without having the pages turn back while a specimen is being examined. Both books are excellent examples of planograph work.

Although these books will be of great interest to the beginner, there are several unavoidable shortcomings which must be kept in mind while using them. First of all, they are primarily for the beginner and have been planned for use in identifying only the commoner animals. Quite a number of the rare families are not considered. It should be emphasized that the student must be sure of his identification—though the specimen is probably common, it may be a rare one which cannot be identified by these incomplete keys. Used with complete keys to orders or families, these books will be of aid even to the more advanced student. Also, one must keep in mind that this is one type of classification and that there are others which differ. Scientists are not completely agreed on all points of classification ; tardigrades, for example, may be arachnids or possibly should be placed in a separate phylum. These differences of opinion, however, should not detract from the good points of the books. Taxonomic works are all too often insufficiently illustrated and Dr. Jacques is to be especially congratulated on his profuse illustration of these books.

—D. C. Lowrie.

LEARN THE TREES FROM

LEAF PRINTS

David S. Marx, 3317 Madison Road, Cincinnati, Ohio, 1938, 32 plates, spiral binding in paper $1.00, cloth $2.00.

Leaf prints of 161 species of trees on thirty-two plates, ten by twelve and a half inches ; printed on one side of the page only so that they may conveniently be used for classroom instruction. Practically all of the commoner trees of the Chicago Area are included.

—W. L. N.

BICKNELL'S THRUSH, ITS TAXONOMY, DISTRIBUTION, AND LIFE HISTORY

By George J. Wallace

Boston Society of Natural History, 1939, 190 pages, $1.25.

The Boston Society of Natural History has published another exhaustive study of a single bird species—the type of work which is now the most crying need of American natural history. Over ninety pages are devoted to the home life of Bicknell's thrush and make en- grossing reading for everyone interested in birds.

WHAT SNAKE IS THAT .

By Roger Conant and William Bridges

D. Appleton-Century Co., 1939, vii, 163 pages, 36 plates, $2.00.

This is the first attempt to produce for reptiles the type of popular keys so well known in bird and flower guides and should appeal particularly to children and adults casually interested in herpetology. The book is limited to species found east of the Rockies, and includes good descriptions in popular wording of all the species. Much of the natural history is especially good, and is useful in answering the usual questions about snakes.

CHARLES DARWIN

By Geoffrey West

Yale University Press, 1938, 359 pages, $3.50.

Mr. West has succeeded in giving a portrayal which is genuinely sympathetic, but still critical, and I believe gives a better picture of Darwin than any recent book. It is seldom that a biography of a naturalist can be recommended to anyone with assurance that the reader will get some pleasure out of it—this book is the first, since one on Huxley six years ago, that may be praised so generally.

A GATHERING OF BIRDS

By Donald Culross Peattie

Dodd, Mead & Co., New York, 1939, 379 pages, $3.00.

This book is a collection of essays accompanied by biographical sketches. The author has chosen the very best literature concerning birds, including from one to five selections from each author. In this way he has developed for the reader a mental picture of the personality of each naturalist. The writers selected for this work include, among others, W. H. Hudson, John Muir, Gilbert White, Cherry Keaton, Robert Cushman Murphy, Thomas Nuttall, William Beebe, Alexander Wilson, Frank M. Chapman, Henry David Thoreau, and John James Audubon. The graceful literary style of Mr. Peattie adds charm to the book and imparts continuity to what otherwise might seem a broken series of many units. The intimate personal notes attract and entice the reader to delve into the selections which follow.

—V. 0. Graham.

WILDFOWL FOOD PLANTS, THEIR VALUE, PROPAGATION, AND MANAGEMENT

By W. L. McAtee

Collegiate Press, Inc., Ames, Iowa, 1939, Svo, cloth, ix, 141 pages, 17 plates, 4 figures. $1.50.

Much has been said and written about food plants for wildfowl, and here is a practical, concise treatise that should be of real value. As a result of his exhaus- tive studies of stomach contents Mr. McAtee knows what wild birds eat. In this book he gives an account of these food plants by families, discusses environmental limitations on the growth of aquatic species, gives practical suggestions on planting and propagation, and on the control of undesirable forms. The last chapter consists of a systematic list of vernacular names of plants discussed.

The author is eminently capable of discussing wildfowl management and food supply and conservationists will find in this book much that will help in solving these problems.

—H. K. Gloyd.

THE WATCHER AT THE NEST

By Margaret Morse Nice

The Macmillan Co., 1939, 8vo, cloth, 159 pages, illustrated. $2.00.

This delightful book gives an intimate account of the lives of several birds but is principally concerned with the ecstacies and tragedies of two famous song sparrows, "Uno" and "4M," whom the author came to know exceedingly well. Observed over a period of several seasons, and individualized by means of colored bands (not to mention their peculiarities of song and habit which became obvious), these birds furnished an opportunity for adding usefully to scientific knowledge and gave much pleasure to the "bird watcher" and her family. Their story is told in a somewhat whimsical style, with much quiet humor, and with a proper emphasis on the scientific implications of their behavior. Its illustrations from drawings by Roger Tory Peterson add much to its charm.

One of the foremost American exponents of "the art of bird-watching," Mrs. Nice has revealed that this type of bird study as a useful avocation has potentialities which may be surprising to many. So much accomplishment in the midst of her otherwise busy life stands as a tribute to her skill in observation and her devotion to the study of birds.

Both professional and amateur ornithologists will find much of interest and of pleasure in *The Watcher at the Nest.*

—H. K. Gloyd.

Field Ornithology

Wm. C. Legg, Mt. Lookout, W. Va. 50 cents per year.

An amateur journal for amateur ornithologists, appearing monthly with twelve to twenty pages per issue. Five numbers have appeared thus far, and the journal is steadily improving. Well worth the nominal subscription cost—be sure you get it from the beginning.

—W. L. *N.*

(Continued from page 59)

gust, it was ready to start spinning its cocoon. The silk glands, from which the silk fluids are produced, are a pair of long tubes which unite at the tip to form the spinning organ or spinneret. The silk, which is fluid when drawn out, hardens rapidly on exposure to air, forming an effective protection against the vagaries of the weather. The outer cocoon was spun first, of close compact gray fibres, very thin and very tough. The inner cocoon, of an ochre-tan color, was fibrous with a smooth hard inner surface. A valve through which the emerging adult would push its way was left at one end. In the inner cocoon the larva changed to a dark brown pupa leaving the shed skin at the end of the cocoon.

The following April, the pupa could be heard moving in the cocoon. About twenty minutes later the head and antennae appeared at the end of the valve-like opening. After much squirming its wing pads, body, and legs appeared. It had emerged. The feathery antennae looked large and the soft, two-inch body enormous. The wrinkled wings were about the size of a dime. Wet and limp, it crawled up the twig and hung down- ward, pumping blood into the wings which slowly expanded and stiffened as the air dried them. The body became more rigid and actually smaller. In twenty minutes the wings were ex- panded and stiffened. The great moth gently spread and folded its wings. That evening it began flying about. The met- amorphosis was complete.

—Gordon Pearsall.

THE NATURALISTS CALENDAR OF EVENTS

This department aims to bring together a chronological list of events and activities of general interest to naturalists of the Chicago Region. Organizations not represented in this issue are invited to send us their announcements for future numbers. For more detailed information write or telephone the office or representative of the organization in question.

CHICAGO ACADEMY OF SCIENCES, Lincoln Park at Clark and Ogden Ave., Diversey 5871.

CHICAGO AQUARIUM SOCIETY, Mr. Harmon K. Greene, Secretary, Plaza 2088. Meetings at the Harvey Restaurant, Strauss Building, third Wednesday of each month.

CHICAGO CACTUS SOCIETY, Mr. Frank K. Balthis, President, Garfield Park Conservatory, Van Buren 8100. Meetings last Sunday each month, Garfield Park Conservatory, 3 :00 P. M.

CHICAGO ENTOMOLOGICAL SOCIETY, Mr. Alex K. Wyatt, Secretary, 5909 N. Virginia Avenue, Ravenswood 3115.

CHICAGO ORNITHOLOGICAL SOCIETY, Mr. Rudyerd Boulton, President, Field Museum, Wabash 9410. Meetings third Tuesday each month, Crerar Library, 8: 00 P. M.

FRIENDS OF OUR NATIVE LANDSCAPE, Miss R. B. Eskil, 6016 Ingleside Avenue. Hyde Park 8313.

GEOGRAPHIC SOCIETY OF CHICAGO, 7 S. Dearborn, Randolph 5293. Resumes meetings in October.

ILLINOIS AUDUBON SOCIETY, Chicago Academy of Sciences, Diversey 5871.

MEN'S GARDEN CLUB OF THE CHICAGO REGION, Mr. 0. V. Morgan, 404 Washington Street, Elmhurst, Secretary. Meetings second Thursday each month.

MID-WEST HORTICULTURAL SOCIETY, Administration Building, Garfield Park, Van Buren 8100. Meetings last Friday each month.

PRAIRIE CLUB, 38 S. Dearborn Street, Dearborn 3737.

STATE MICROSCOPICAL SOCIETY OF ILLINOIS, W. L. Necker, Chicago Academy of Sciences, Diversey 5871.

June 3 — Marquette Geologists' Association Auditorium, Chicago Academy of Sciences, 8:00 P.M.

June 4 — Prairie Club walk near Elk Grove.

June 8 — Men's Garden Club of the Chicago Region, Great Northern Hotel, 12:00 M.

June 10 — The Friends of Our Native Landscape present for the twenty-third year *The Beauty of the Wild,* a masque by Kenneth Sawyer Goodman. The masque is given at Kankakee, Illinois, at sundown, and is followed by a conser-vation Council Fire for the purpose of creating interest in the 10,000 acre state park site at Kankakee. The public is invited and admission is free. Address inquiries to C. B. Andrews, 8 East Huron Street, Chicago.

June 10 and 11 — Flower Show of the Midwest Horticultural Society in co-operation with the American Iris and American Peony Societies, Horticultural Hall

at Garfield Park Conserva-tory, 8 :00 A. M. to 10:00 P. M. All flower lovers are invited to participate and admission is free. Address inquiries to Dick Cook, Lansing Hotel, 1036 North Dearborn Street, Chicago.

June 15 Amateur Herpetologists Auditorium, Chicago Academy of Sciences,7 :30 P. M.

June 16 Audubon Nature Camp opens at Todd Wildlife Sanctuary, Maine. The season lasts until August 31 and inquiries should be addressed to the National Association of Audubon Societies, 1006 Fifth Avenue, New York City.

June 16 State Microscopical Society of Illinois, Auditorium, Chicago Academy of Sciences, 8:00 P.M.

June 18 Chicago Entomological Society, Reading Room of the Chi-cago Academy of Sciences, 2:00 P.M.

June 20 Prairie Club open meeting, *Animal Life in the Arid Southwest,* Dr. Howard K. Gloyd, Auditoruim, Chicago Academy of Sciences, 8:00 P.M. Dinner at Brauer's Cafe in Lincoln Park will precede the meeting.

June 20 Chicago Ornithological Society Annual Meeting, Green Room of Auditorium Building, 431 South Wabash Avenue, 8:00 P.M.

June 21 Chicago Aquarium Society Meeting, Brauer's Cafe in Lincoln Park. A varied program under the direction of Floyd Young has been prepared for members and visitors. Dinner at 7:00 P.M.

June 25 Chicago Cactus Society, Garfield Park Conservatory, 3:00 P.M.

June 25 to July 1 Friends of Our Native Landscape hold their second School of the Dunes at Dune Acres Club House, Dune Acres, Indiana. Address inquiries to E. L. Wheeler, 224 West Huron Street, Chicago.

June 30 Midwest Horticultural Society, *Herb Gardens,* Mrs. George B. Ward, LaSalle Hotel, 8:00 P. M.

July 1 to July 31 Geographic Society of Chicago, complete circle tour of Alaska under the guidance of Wallace F. Worthley. Address inquiries to Miss Anna Conwell, 7 South Dearborn Street, Chicago.

July Prairie Club annual rose walk near Willow Springs, 4 miles. A date will be set to correspond with the blooming of the flowers.

July 13 Men's Garden Club of the Chicago Region, Great Northern Hotel, 12:00 M.

July 13-14-15 Seventh Annual Convention of the Men's Garden Clubs of America, Elmhurst College, Elmhurst, Illinois. Outstanding speakers will participate and special programs of interest to all home gardeners have been arranged. Address inquiries to Mr. Hoyt Paxton, 175 West Jackson Boulevard, Chicago.

July 20 Amateur Herpetologists, Auditorium, Chicago Academy of Sciences, 7:30 P.M.

July 28 Midwest Horticultural Society garden tour, starting at noon. Reservations; Mrs. Harry R. Winter, 617 North Harvey Avenue, Oak Park, Illinois.

July 30 Chicago Cactus Society, Gar field Park Conservatory, 3:00 P. M.

Aug. 10 Men's Garden Club of the Chicago Region, Great Northern Hotel, 12:00 M.

Aug. 17 Amateur Herpetologists, Auditorium, Chicago Academy of Sciences, 7:30 P.M.

The Chicago Academy of Sciences

by its museum, libraries, lectures, extension work, research, and publications fills a definite place in the educational life of the Chicago R egion. Membership in the Academy supports this valuable and wide-reaching program of activities in the field of natural history.

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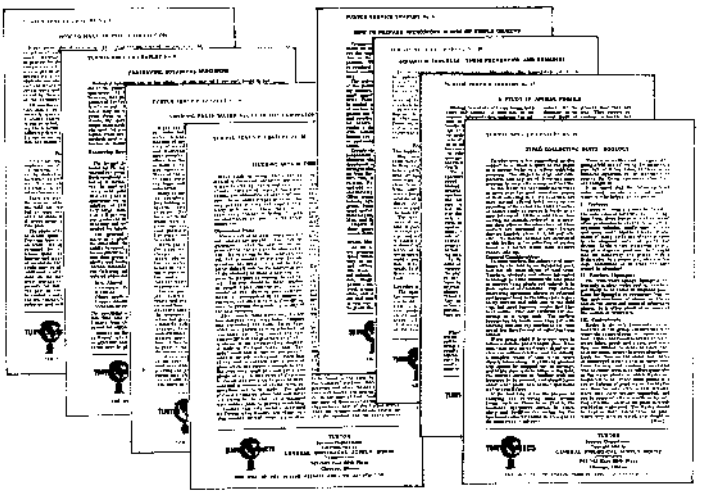
The Chicago Naturalist is now available to institutions such as libraries, schools, and clubs at a subscription price of $1.50 per year.

PRACTICAL HELPS
for
BIOLOGY AND NATURE STUDY



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When requesting service leaflets and catalogs please mention "The Chicago Naturalist"

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